29. (New) The SMA switch of claim 22 wherein said first contact arm is situated within a travel path of said cursor such that said first contact arm is displaced by said cursor as said cursor moves from said second to said first position, said displacement bringing said first contact arm into contact with said second contact arm.

## REMARKS

Claims 1 - 26 are pending in the application.

Claims 1-4, 8-10, 15 and 16 are rejected.

Claims 5-7, 11-14 and 17-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 8-10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner points out that there is insufficient antecedent basis for the limitation "said first contact arm" in line 1 of claim 8. Applicants have amended claim 8 so that it now depends from claim 2, which introduces the "first contact arm" limitation. Applicants respectfully submit that claims 8-10 now comply with the requirements of 35 U.S.C. § 112.

**Claims 1 and 15**

Claims 1 and 15 are readily distinguishable over the prior art because they claim a *continuous* SMA element. Applicants note with appreciation that the Examiner has correctly concluded that U.S. Patent No. 4,887,430 to Kroll et. al ("the Kroll patent")

does not describe a continuous SMA element. The Office action does, however, allege that the Wolf reference (West German Patent Application No. DE03731146A) discloses a "continuous SMA element." Applicants respectfully submit that the Wolf reference does not disclose a continuous SMA element.

To the contrary, the Wolf reference explicitly describes its drive device as having a "two-part element made of shape-memory alloy" where the two parts are "connected by a linking member (4)[.]" (*See* Abstract). If elements 1 and 2 are connected by linking member 4 they can not be a unitary structure. This description stands in stark contrast to the "continuous SMA element" described in amended claim 1.

Furthermore, Figures 1-3 of the Wolf reference clearly show the two SMA elements 1 and 2 as distinct and separate, each connected to linking member 4. Applicants respectfully but strenuously disagree with the Examiner's characterization of Figure 1 as disclosing a continuous SMA element. Although Fig. 1 of the Wolf reference shows a line through connecting member (4), this line represents the lower boundary of a segment (5) of the connecting member (4), not the continuity between element 1 and element 2. Because none of the cited references describe a single continuous SMA element, Applicants respectfully submit that the Office action fails to establish a prima facie case of obviousness for independent claims 1 and 15.

**New Claims**

New Claims 27-29 have been added in response to the notice of allowable subject matter. Applicants respectfully submit that no new material has been added by these new claims and that support for each claim exists in the specification. New claim 27 contains

limitations described in dependent claim 5, which depends from dependent claim 2. Support is also found in the specification at page 9 line 14 to page 10 line 6 and in Fig. 1. New claim 28 contains limitations described in dependent claim 6, which depends from dependent claim 2. Additional support in the specification is found at page 13 line 5 to page 14 line 9 and in Figs. 9-10. New claim 29 contains limitations described in dependent claim 8, which, as amended, depends from dependent claim 2. Additional support is found at page 10 line 7 to line 22 and in Figs. 2-3. Applicants respectfully submit that these claims are in condition for allowance and earnestly solicit the allowance of these claims.

**CONCLUSION**

Applicant respectfully submits that the foregoing amendments and remarks overcome the rejections raised by the Examiner and that the specification and claims are in proper form and condition for allowance.

Outside the fee for a three month extension and for additional claims, it is believed that no other fee is due at this time. Should any fee be required for any reason related to this document, however, the Commissioner is authorized to charge said fee to Deposit Account No. 08-3038, referencing Docket No. 12554.0004.NPUS00. The Examiner is hereby respectfully invited to contact the undersigned attorney with any questions, comments or suggestions relating to this application.

Respectfully submitted,

Dated: June 28, 2002

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**APPENDIX A**

Therefore, we claim:

1. A shape memory alloy (SMA) switch comprising:

a substrate;

a continuous SMA element attached to said substrate at first and second locations and having a first portion and a second portion, said first portion contracting to place said SMA element in a first conformation upon being heated above a predetermined temperature and said second portion contracting to place said SMA element in a second conformation upon being heated above said predetermined temperature; and

a cursor attached to said SMA element at a location substantially intermediate said first and said second portions to reciprocate between a first position when said SMA element is in said first conformation and a second position when said SMA element is in said second conformation.

2. The SMA switch of claim 1 further comprising a first contact arm situated adjacent said cursor, said first contact arm having an open position and a closed position, said cursor being in sliding contact with said first contact arm to move said first contact arm from said open position to said closed position as said cursor moves from said second position to said first position.

3. The SMA switch of claim 2 wherein said first contact arm is electrically conductive.

4. The SMA switch of claim 1 further comprising means for separately applying sufficient heat to said first and said second portions of said SMA element to reciprocate said cursor between said first and said second positions.

5. The SMA switch of claim 2 further comprising a second contact arm and an electrically conductive short bar disposed on said cursor to create first and second electrical contact points, said first and second contact arms being biased to contact said cursor such that, when said cursor is in said first position, said first and said second contact arms are electrically coupled to each other via said short bar to close said SMA switch, said bias of said first and said second contact arms providing a force to maintain said cursor in said first position.

6. The SMA switch of claim 2 wherein said cursor has two lateral side surfaces, one of said lateral side surfaces having a first cut-away portion dimensioned to interlock with said first contact arm and the other of said lateral side surfaces having a second cut-away portion to interlock with a second contact arm such that said interlocking between said lateral side surfaces and said first and second contact arms maintains movement of said cursor substantially within a single plane as said cursor moves between said first and second positions.

7. The SMA switch of claim 5 wherein said first and second electrical contact points are recessed within said cursor to receive said first and said second contact arms.

8. The SMA switch of claim [1] 2 wherein said first contact arm is situated within a travel path of said cursor such that said first contact arm is displaced by said cursor as said cursor moves from said second to said first position, said displacement bringing said first contact arm into contact with a second contact arm to place said first contact arm into said closed position.

9. The bistable SMA switch of claim 8 wherein said cursor has a lateral surface in contact with said first contact arm, said lateral surface including a projection located at a position on said lateral surface such that as said cursor moves from said second position to said first position, said first contact arm first encounters a first slope of said projection that displaces said first contact arm into abutting engagement with said second contact arm and as said cursor continues toward said first position, said first contact arm encounters a second slope of said projection that permits displacement of said first contact arm in a direction opposite to said displacement caused by said first slope as said cursor moves from said second to said first position.

10. The SMA switch of claim of 9 wherein said second contact arm is biased to exert a force on said first contact arm that has a component which is substantially perpendicular to a direction of travel of said cursor between said first and second positions, said component of said force acting against said projection to provide resistance against movement of said cursor from said first to said second position.

11. The switch of claim 4 wherein said means for separately applying heat comprises a first electrical circuit that includes said first portion of said SMA element and a second electrical circuit that includes said second portion of said SMA element, said first and second circuits sharing a common ground fixedly attached to a mounting surface upon which said substrate is mounted.

12. The switch of claim 11 further comprising a spring component connected to said SMA element to maintain an electrical connection between said SMA element and said common electrical ground while permitting said SMA element to alternate between said first and second conformations.

13. The switch of claim 11 further comprising a brush element in sliding contact with said common electrical ground, said brush element being connected to said SMA element to maintain an electrical connection between said SMA element and said common electrical ground while permitting said SMA element to alternate between said first and second conformations.

14. The switch of claim 11 wherein said common ground comprises a wire bond electrically connecting said SMA element to said mounting surface via said cursor.

15. A bistable shape memory alloy (SMA) switch comprising:

a substrate;

a transducer connected to said substrate comprising a single continuous SMA element having first and second conformations and including:

a) a first heating unit coupled to a first segment of said SMA element to heat said first segment above a predetermined temperature causing contraction of said first segment so that said SMA element assumes said first conformation; and

b) a second heating unit coupled to a second segment of said SMA element to heat said second segment above said predetermined temperature causing contraction of said second segment so that said SMA element assumes said second conformation;

a cursor coupled to said SMA element to reciprocate between first and second positions as said SMA element alternates between said first and said second conformations;

a first contact arm in sliding contact with said cursor to move from an open position to a closed position as said cursor moves from said second to said first position.

16. The SMA switch of claim 15 wherein said first and second heating units respectively comprise a first electrical circuit and a second electrical circuit, said first and second electrical circuits sharing a common node on said SMA element.

17. The SMA switch of claim 16 wherein said common node includes an electrical ground fixedly attached to a mounting surface upon which said substrate is mounted and a spring component extending from said electrical ground to said SMA element to

maintain electrical connectivity between said SMA element and said electrical ground while permitting movement of said SMA element between said first and said second conformations.

18. The SMA switch of claim 16 wherein said common node includes an electrical ground fixedly attached to a mounting surface upon which said substrate is mounted and a brush element in sliding contact with said electrical ground and fixedly attached to said SMA element to maintain electrical connectivity between said SMA element and said electrical ground while permitting movement of said SMA element between said first and said second conformations.

19. The SMA switch of claim 15 wherein said cursor includes a short bar having first and second contact points, said bistable SMA switch further comprising a second contact arm wherein said first and said second contact arms are both biased to contact said cursor such that, when said cursor is in said first position, said first and said second contact arms are electrically coupled via said short bar, said first contact arm is mechanically coupled to said first contact point, and said second contact arms is mechanically coupled to said second contact point.

20. The SMA switch of claim 19 wherein said first and said second contact points are recessed into said cursor.

21. The SMA switch of claim 15 further comprising a second contact arm, said first contact arm being situated within a travel path of said cursor such that said first contact arm is moved into said closed position to contact said second contact arm as said cursor moves from said second to said first position.

22. A shape memory alloy (SMA) switch comprising having open and closed states comprising:

a substrate;

a single continuous SMA element connected to said substrate at first and second locations and having first and second sections, said first section contracting to place said SMA element into a first conformation upon being heated above a predetermined temperature and said second section contracting to place said SMA element into a second conformation upon being heated above said predetermined temperature;

a cursor coupled to said SMA element substantially between said first and said second sections to reciprocate between first and second positions as said SMA element alternates between said first and said second conformations;

a first contact arm biased toward said cursor for sliding contact with said cursor as said cursor moves from said first to said second position, said first contact arm being positioned within a travel path of said cursor so that as said cursor moves from said second to said first position, said first contact arm becomes electrically coupled to a second contact arm to trigger said closed state of said SMA switch; and

means for separately and independently heating said first and said second sections of said SMA element.

23. The SMA switch of claim 22 wherein a bias of one of said first and said second contact arms toward said cursor exerts a force on said cursor to maintain said closed state of said switch when said cursor is in said first position.

24. The SMA switch of claim 22 wherein said heating means includes a first electrical circuit that includes said first section of said SMA element and a second electrical circuit that includes said second section of said SMA element.

25. The switch of claim 24 wherein said first and said second electrical circuits share a common node comprising an electrical ground fixedly attached to a mounting surface upon which said substrate is mounted and a spring component connected to said SMA element to provide electrical connectivity between said SMA element and said common ground while permitting movement of said cursor between said first and said second positions.

26. The SMA switch of claim 24 wherein said first and said second electrical circuits include a common node comprising an electrical ground fixedly attached to a mounting surface upon which said substrate is mounted and a brush element in sliding contact with said electrical ground and fixedly attached to said SMA element to provide electrical connectivity between said SMA element and said common ground while permitting movement of said cursor between said first and said second positions

27. The SMA switch of claim 22 further comprising an electrically conductive short bar disposed on said cursor to create first and second electrical contact points, said first and second contact arms being positioned with respect to said cursor such that, when said cursor is in said first position, said first and said second contact arms are electrically coupled to each other via said short bar to close said SMA switch.

28. The SMA switch of claim 22 wherein said cursor has two lateral side surfaces, one of said lateral side surfaces having a first cut-away portion dimensioned to interlock with said first contact arm and the other of said lateral side surfaces having a second cut-away portion to interlock with said second contact arm such that said interlocking between said lateral side surfaces and said first and second contact arms maintains movement of said cursor substantially within a single plane as said cursor moves between said first and second positions.

29. The SMA switch of claim 22 wherein said first contact arm is situated within a travel path of said cursor such that said first contact arm is displaced by said cursor as said cursor moves from said second to said first position, said displacement bringing said first contact arm into contact with said second contact arm.